FROM THE PRINCIPLES TO THE PRACTICE F0R MANAGING THE NETWORKING OF THE ECOLOGICAL HABITATS, FOR THE BIODIVERSITY AND ECOLOGICAL SUSTAINBILITY IN THE RIVERINE FORESTS OF SINDH.

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Abstract: Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which are categorized as “Riverine Forests”, locally known as Kacho forests. It has been noticed since many years the land of Riverine Forests been allocated for the agricultural purposes to major land lords of Sindh Province. Due to this unusual and illegal land allotment against The Supreme Court of Pakistan Verdict, has created serious problems of environmental degradation. The crux of the matter is the devastation of Riverine Forests, naturally affected the Ecological Habitats, ultimately, a serious and severe impact noticed in the shape of multiple plants and animal species have been endangered. This illegal allotment of riverine Forests land should be cancelled immediately, and steps should be taken to reassess, to reorganize and to maintain natural habitats networking to achieve sustainability through the environmental management in the Riverine Forests of Sindh.

Key words: *Habitat, Environment, Sustainability, Forests, Riverine, Heritage, Species.*

1. Introduction

Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which are categorized as "Riverine Forests"; locally known as Kacho forests. These forests are located along both the banks of River Indus in Thatta, Hyderabad, Dadu, Larkana, Naushero Feroze, Nawabshah, Khairpur, Sukkur, Shikarpur, Ghotki and Jacobabad Districts and have been declared as “Reserved Forests” under Forests Act, 1927. **(Wildlife Department Govt: of Sindh).**

An ecological habitat is a fundamental component / element of an ecosystem in an environment. It plays a vital role in maintaining growth and development of a single species or number of species in an ecosystem of a particular area. A systematic interaction grows and develops in this area of nature. A habitat has multiple but essential component parts in an ecosystem. If the removal of any part or component of a habitat has serious implication for an organism, such as water, grass, bushes, trees, and any change in land topography affects severely an organism. The vulnerability of any organism can be assessed separately; its degree of vulnerability is variable in consequences. As the effects of fire in a woodland have severe impacts on the habitat, such as; the urgent migration, with undefined direction destroys organism, even death may occur in some

cases. In the same way the shortage of water in a fish pond affects fishes and many other organisms at great scale. Drought in in a region affects organisms severely. Thus it's necessary to maintain an ecosystem, it's more essential to maintain habitat first. The habitat is a primary area of nature, which provides growth and development to an organism. To maintaining the balance in an ecosystem, should be focused properly, otherwise the reaction would be intense with extraordinary effects in an environmental conditions.

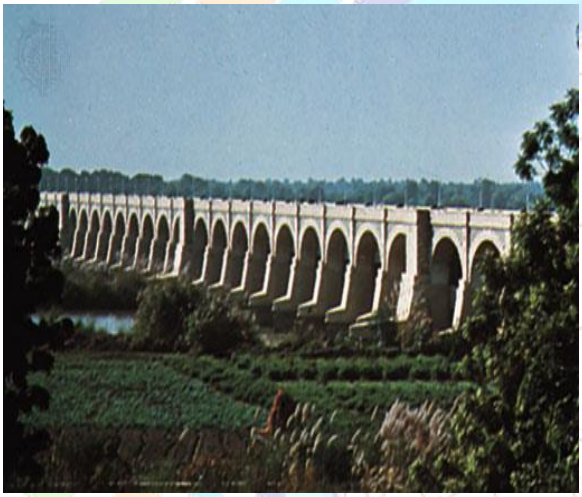


Fig No:1. Indus Lifeline Historic Sukkur Barrage.

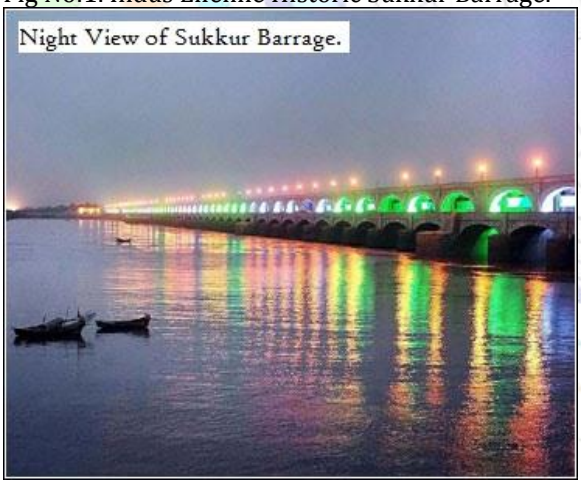


Fig No: 2.Night view of Sukkur Barrage.

2. Study Area.

The Riverine forests of the River Indus. The converting of Riverine Forests into Agricultural Farms, and water shortage severely affected the habitat, consequently endangered the several species in the Riverine Forests of Sindh.

Fig No: 3. Forest Route with Neem Trees.

3. Research Methodology.

The physical surveys, literature reviw, and expert opinion regarding the status of Riverine Forests area of Indus River. The wildlife has direct impacts on the habitat and biodiversity of the Riverine Forests areas of the River Indus.

4. Discussion.

Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which are categorized as "Riverine Forests"; locally known as Kacho forests. These forests are located along both the banks of River Indus in Thatta, Hyderabad, Dadu, Larkana, Naushero Feroze, Nawabshah, Khairpur, Sukkur, Shikarpur, Ghotki and Jacobabad Districts and have been declared as "Reserved Forests" under Forests Act, 1927. (Wildlife Department Govt: of Sindh).

The riverine forests of the River Indus are the major source of wildlife biodiversity of the region. Riverine forests play vital role in managing the balance in an

ecosystem. Currently the riverine forests face greatest danger and posing serious threat to wild life of the riverine forests.

4.1 Threats to riverine Forests.

1. **Reduced downstream flow of water.**
2. **Deforestation in the Riverine region.**

These threats ultimately led to destruction of habitat that has endangered the wildlife communities of the riverine forests of Sindh.

Fig No: 4. Agricultural activities in Forest Riverine Area.

4.2 Flora of Sindh.

1. The dwarf palm, Kher (Acacia ruprstris).
2. Lohirro (Techoma undulata) are typical of the western hill region as are Khip (Periploca aphylla) and
3. Phog (Calligonum polygonides) of the eastern sandy desert. In the central valley.
4. Babbur (Acacia nilotica) tree is the most dominant and occurs in thick forests along the Indus banks.

5. The Nim (Azadirachta inidica), Ber (Ziziphus vulagaris).
6. Jujuba, Lai (Tamarix orientalis),
7. Kirrir (Capparis aphyla).

8. Kandi (Prosopis cineraria) are the more common trees.

9. Mango, date palms, banana, guava, orange and chiku are the typical fruit bearing trees.

10. The coastal strips and the creeks abound in semiaquatic and aquatic plants, and inshore deltaic islands have mangrove forests of

11. Timmar (Avicennia marina) and Chaunir (Ceriops tagal) trees. **Water lilies** grow in abundance in the numerous lakes and ponds, particularly in the Lower Sindh region.

Fig No: 5, Pond near Luckky.

Fig No: 6, Riverine Forest near Dadu District.

Fig No: 7, Riverine Forest near Hala.

Fig. 2. Urial (*Ovis vignei*) (source: Sindh Wildlife Department). Fig. 3. Chinkara (*Gazella bennettii*)

Fig No: 8, Sindh Ibex. Source, Sindh Wildlife Department Government of Sindh.

4.3 FAUNA OF SINDH

Among the wild animals, the

1. Sareh (Sindh ibex),
2. Urial or Gadh (wild sheep), and
3. Black bear are found in the western rocky range, where the leopard is now rare.
4. The Pirrang (large tiger cat or fishing cat) of the eastern desert plains is also disappearing.
5. Deer live in the lower rocky plains and in the eastern region, as do the
6. Charakh (striped hyena),
7. Jackal, fox, porcupine, common gray mongoose, and hedgehog.
8. The Sindhi phekari (red lynx or caracal cat) is encountered in some areas.
9. Pharrho (hog deer) and wild boar occur particularly in the central inundation belt.
10. There is a variety of bats, lizards, and reptiles, including.
11. The cobra, Lundi (viper), and the Peean, the mysterious Sindh krait of the Thar region, which is supposed to suck the victim's breathe in his sleep.
12. Crocodiles are rare and inhabit only the backwaters of the Indus and its eastern Nara channel. Besides a large variety of marine fish.
13. The plurnbeous dolphin, the beaked dolphin, rorqual or blue whale, and a variety of skates frequent the seas along the Sindh coast.
14. The Pallo (sable fish), though a marine fish, ascends the Indus annually from February to April to spawn and returns to the sea in September.
15. The Bulhan (Indus dolphin) breeds in the Rohri-Sukkur section of the river. **(Wildlife Department Govt: of Sindh).**


Fig No: 9, Indus Dolphin Sukkur.


Fig No: 10, Wild hen in the forest.


Fig No: 11, Migratory Birds at Kalri Lake.


Fig No: 12, Sindh Ibex, and Deer, at Khirthar National Park.

4.4 Factors Responsible for Destruction of Habitat.

There are several situations, which affect the habitat, such as;

1. Fire in the forest.
2. Flood in the grassland and. Forests.
3. Major Earthquake on the fault lines ecosystems.
4. Volcanic Eruption.
5. Soil Erosion.
6. Mining blasts in an area.
7. Acute shortage of water.
8. Over Grazing.
9. Construction of Roads, Dams, and other economic development.
10. Agricultural activities in forest land.
11. Chopping of the trees from forests.
12. Chemical discharge in the water estuary.

4.5 THE MANAGEMENT OF THE HABITAT.

To secure the endangered species certain profound changes are required in the habitat structure. These structural adjustments or changes have been adapted in England, and Scotland to secure local endangered species on large scale.

4.6 ASSESSMENT OF HABITAT.

Normally habitats can be assessed on two basic concepts.

1. **Structural Connectivity.**
2. **Non-structural connectivity**.

4.6.1 Structural Connectivity.

The structural connectivity is based upon the internal physical connection between two habitats, by single connectivity or multiple connectivity. It could be linked by the water estuary, woodland, and through the bushes between two habitats.

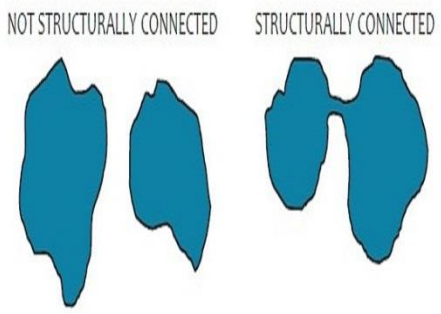


Fig No: 13. Structural and Non-Structural connectivity Between Two Habitats. Scottish Natural Heritage, 2011.

4.6.2 Non-Structural Connectivity.

Non-structurally connected habitats provide no link for an organism to move for functional utility in an area. Therefore, it reduced the chances of growth and development on the maximum level.

4.6.3 FUNCTIONAL CONNECTIVITY.

When physical movement of an organism is unrestricted, from one habitat to another habitat, it's called functional connectivity. In other words it's known as Landscape Permeability. Functional connectivity provides organism unrestricted activities for the growth and development in an area of nature or a habitat.

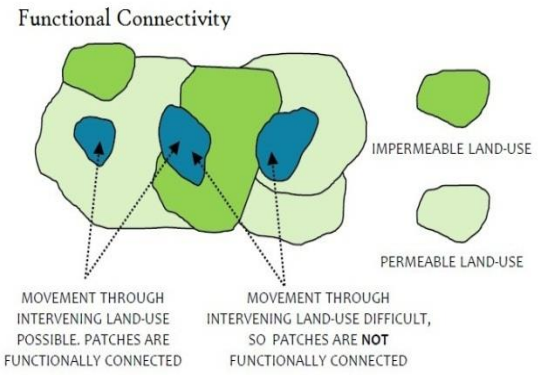
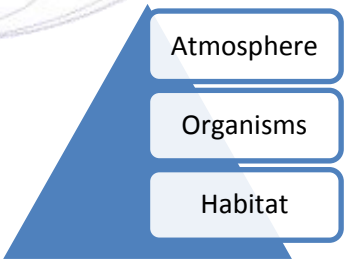


Fig No: 14. Functional connectivity between two or more habitats. Source: Scottish Natural Heritage. 2011

4.6.4 HABITAT NETWORKS.

These are the primary processes to secure the habitat. Habitat networks are separate areas where, organisms move, grow, and rear the off-springs freely, without any restriction. Thus habitat networks provide opportunity to individual organism to get connected with multiple habitats. THE PARAMID.



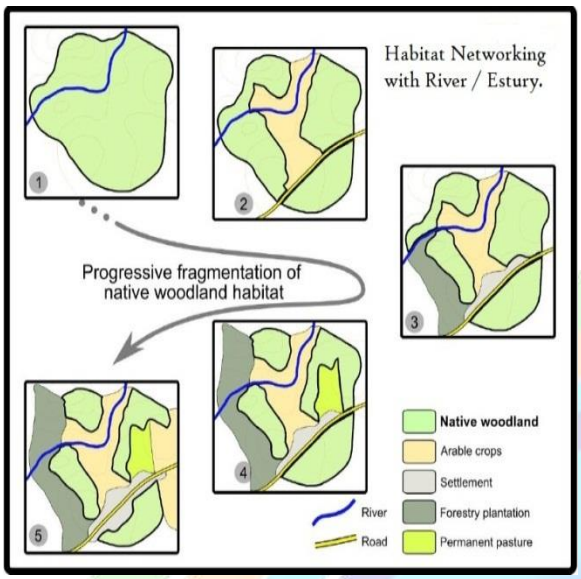


Fig No: 15, Habitat Networking Model. Source: Scottish Natural Heritage, 2011.

An interactive communication integrates multiple habitats, which proved beneficial for habitat sustainability in environmental management in general.

Small patches of habitat connected through rivers, estuaries, and water channels become easy enter and exist for a single species or multiple species. In today's world, man has greater degree of accessibility and interaction with habitat, which affects habitats directly. For example; a road between the habitats has for reaching consequences in maintaining habitat. The habitats are highly fragile and fragmented, due to nearby human activities; therefore, it's essential to maintain the habitats on emergency basis. Habitat networking resolves the acute situation of fragmentation in the system. Networking channels easily are utilized by the animals, plants, birds and fishes in a pond.

4.6.5, HABITAT NETWORK MANAGEMENT.

Habitat networks divided into three basic component parts.

1. **Core Habitat.**
2. **Matrix.**
3. **Movement Routes.**

1. Core Habitat.

An area of the nature, which includes all essential components for the growth and development. The essential components such as; sunlight, temperature, water, heat, air, producers, consumers, and decomposers should be available. All these essential components play vital role for conservation.

2. Matrix.

Matrix is the land around the core. Organisms for specific purpose have to cross the matrix frequently, such as; prevalence heat / temperature they require shades to cool their bodies, even cross the matrix to another habitat. If any urban area divides two habitats, its natural this area would work as a barrier. Urban areas have specific characteristics, such as; sound, human movement, traffic, transportation and other means of communications, hamper the movement of animals, birds, etc. from habitat to habitat.

3. Movement Routes.

These are special type of routes or corridors to be develop between the habitats. These routs should have specific features of land topography as it could give a natural look on one hand, and should special designs like stone stepping

to help the animals to cross, walk, or run on these routes easily.

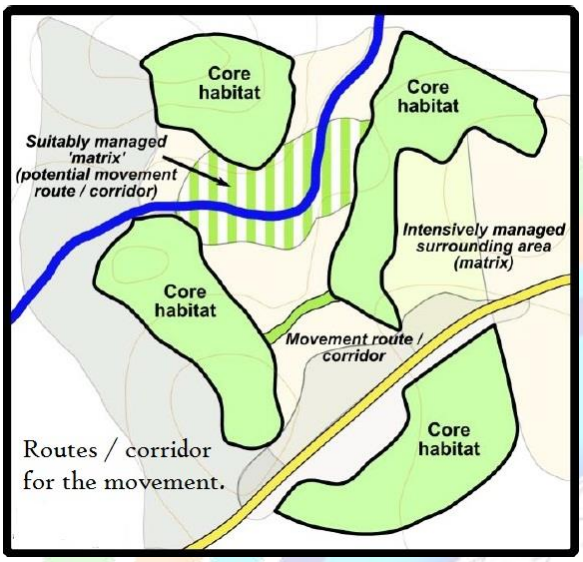


Fig No: 16. A. Core Habitats, B. Matrix, C. Movement Corridor / Routes. Source: Scottish National Heritage, 2011.

5. Results:

Primarily the habitat is a fundamental part of environment of any specific region, whether its terrestrial or aquatic environment. The management of habitat requires most essential prerequisites to look after and to maintain a single species or a number of species in a community. The major components of habitat such as; core, matrix and corridor routes are insufficient or absent, consequently, the habitat is incomplete, deficient, and have no ability to sustain the conservation process. Riverine forests of Sindh have multiple threats from the military and civil beaurucracy, politicians, and local land lords in its devastation.

The riverine forests of Sindh are the backbone of the local climate and environment in general. In the absence of these forests have direct effects upon the habitats; consequently, the chain reaction is obvious and ultimate in the coming days. The severe effects of loss of the habitats have made multiple species highly vulnerable. Keeping in view, it's essential to maintain properly the habitats for the growth and development of species.

Bibliography

1. Pandey. KC, Environmental Ecology, Bombay Press, 1995.
2. Odom. EP, Fundamentals of Ecology. UK, 1975.
3. Habitat Networking: From Principles to Best Practice, Scottish National Heritage, 2011.
4. An Essential Guide to Habitat Networks. Scottish National Heritage, 2011.
5. Wildlife Department, Government of Sindh. www.sindhwildlife.com.pk
6. Enger. Smith. Environmental Science. Sixth Edition, McGraw Hill, 2005.
7. The Conservation Science. Minerva Press, Hong Kong. 2000.

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